

Claims

1. A composition comprising:
 - a hyperbranched polymer attached to a core; and
 - a biologically active moiety;whereby the biologically active moiety is attached to the core by means of a substantially non-enzymatically cleavable linker L.
2. The composition of claim 1, wherein the hyperbranched polymer is water soluble.
3. The composition of claim 1 or 2, wherein the hyperbranched polymer contains at least two molecular chains, which molecular chains are of sufficient length to be so arranged as to form a cavity to accommodate the biologically active moiety.
4. The composition according to any of the above claims, wherein the polymer chains contain linear, branched or cyclical alkyl chains.
5. The composition according to any of the above claims, wherein further groups are present in the polymer chains, the further groups being selected from the groups consisting of S, N, O, (-S-S)-, oxyethylen, oxypropylene and oxybutylene, amide - C(O)NH- or C(O)NR-, -S-succinimido, amino (-NR-), carboxylic ester (-C(O)O-), sulfonamide (-S(O)₂-NR-, carbamate (-O-C(O)-NR-), carbonate (-OC(O)-O-), sulfone (-S(O)₂-), ether (-O-), oxime (-CR=N-O-), hydrazone (-CR=N-NR-), urea (-NR-C(O)-NR-), thiourea (-NR-C(S)-NR-), carbohydrate, glyceryl, phosphate (-O-P(O)(OR)O-), phosphonate (-P(O)(OR)O-), saturated and nonsaturated (hetero)cyclic groups, in which R is H, a linear, branched or cyclical alkyl groups which may contain further functional groups or hetero atoms.

6. The composition according to any one of the above claims, wherein the molecular chains contain sterically demanding capping groups C.
7. The composition according to claim 6, wherein the capping groups C within the molecular chains contain linear, branched or cyclical alkyl chains.
8. The composition according to claim 6 or 7, wherein the capping groups C contain further groups selected from the groups consisting of S, N, O, (-S-S)-, oxyethylen, oxypropylene and oxybutylene, amide $-C(O)NH-$ or $C(O)NR-$, -S-succinimido, amino (-NR-), carboxylic ester ($-C(O)O-$), sulfonamide ($-S(O)_2-NR-$), carbamate ($-O-C(O)-NR-$), carbonate ($-O-C(O)-O-$), sulfone ($-S(O)_2-$), ether (-O-), oxime ($-CR=N-O-$), hydrazone ($-CR=N-NR-$), urea ($-NR-C(O)-NR-$), thiourea ($-NR-C(S)-NR-$), carbohydrate, glyceryl, phosphate ($-O-P(O)(OR)O-$), phosphonate ($-P(O)(OR)O-$), saturated and nonsaturated (hetero)cyclic groups in which R is H, linear, branched or cyclical alkyl groups which may contain further functional groups or hetero atoms.
9. The composition according to any of claims 6 to 8, wherein the capping groups C are highly branched molecules containing branching centers with a branching degree of between 2 and 6.
10. The composition of claim 9, wherein the capping groups C include at least one thio-succinimido moiety resulting from a reaction between a maleimido group and a thiol group.
11. The composition according to any one of the above claims, wherein the biologically active moiety is a biopolymer.
12. The composition according to any one of claims 1 to 10, wherein the biologically active moiety is selected from the group of proteins or polypeptides consisting of ACTH, adenosine deaminase, agalsidase, albumin, alfa-1 antitrypsin (AAT), alfa-1 proteinase inhibitor (API), alteplase, anistreplase, anicard serine protease, antibodies (monoclonal or polyclonal, and fragments or fusions), antithrombin III, antitrypsins,

aprotinin, asparaginases, biphalin, bone-morphogenic proteins, calcitonin (salmon), collagenase, DNase, endorphins, enfuvirtide, enkephalins, erythropoietins, factor VIIa, factor VIII, factor VIIa, factor IX, fibrinolysin, fusion proteins, follicle-stimulating hormones, granulocyte colony stimulating factor (G-CSF), galactosidase, glucagon, glucocerebrosidase, granulocyte macrophage colony stimulating factor (GM-CSF), phospholipase-activating protein (PLAP), gonadotropin chorionic (hCG), hemoglobins, hepatitis B vaccines, hirudin, hyaluronidases, iduronidase, immune globulins, influenza vaccines, interleukins (1 alfa, 1 beta, 2, 3, 4, 6, 10, 11, 12), IL-1 receptor antagonist (rhIL-1ra), insulins, interferons (alfa 2a, alfa 2b, alfa 2c, beta 1a, beta 1b, gamma 1a, gamma 1b), keratinocyte growth factor (KGF), transforming growth factors, lactase, leuprolide, levothyroxine, luteinizing hormone, lyme vaccine, natriuretic peptide, pancrelipase, papain, parathyroid hormone, PDGF, pepsin, platelet activating factor acetylhydrolase (PAF-AH), prolactin, protein C, octreotide, secretin, sermorelin, superoxide dismutase (SOD), somatropins (growth hormone), somatostatin, streptokinase, sucrase, tetanus toxin fragment, tilactase, thrombins, thymosin, thyroid stimulating hormone, thyrotropin, tumor necrosis factor (TNF), TNF receptor-IgG Fc, tissue plasminogen activator (tPA), TSH, urate oxidase, urokinase, vaccines, and plant protein such as lectins and ricins.

13. The composition of any one of claims 1 to 10, wherein the biologically active moiety is insulin.
14. The composition according to any one of claims 1 to 10, wherein the biologically active moiety is an organic small molecule bioactive agent.
15. The composition according to claim 14, wherein the biologically active moiety is selected from the group of organic small molecule bioactive agents consisting of central nervous system-active agents, anti-infective, anti-neoplastic, antibacterial, anti-fungal, analgesic, contraceptive, anti-inflammatory, steroidal, vasodilating, vasoconstricting, and cardiovascular agents.
16. The composition of any one of claims 1 to 10, wherein the biologically active moiety is an anti-sense or interfering oligonucleotide.

17. The composition according to any of the above claims, wherein the encapsulating organic compound has a dendritic structure.
18. The composition of any one of the above claims, wherein the hyperbranched molecule comprises a first branching unit B with
- a first branching centre Bc
 - at least two first branching functional groups Bfg
 - at least two molecular chains connected to the at least two first branching functional groups Bfg.
19. The composition of claim 18, wherein the first branching center Bc contains groups selected from $>C<$, $>CH-$, $>CR-$, $>N-$, $>P-$ which are linkable linked to the first branching functional groups Bfg.
20. The composition of claim 18 or 19, wherein the first branching unit B contains linear, branched or cyclical alkyl chains.
21. The composition of claim 19, wherein the first branching unit B further comprises groups selected from the groups consisting of S, N, O, $(-S-S)-$, oxyethylen, oxypropylene and oxybutylene, amide $-C(O)NH-$ or $(C(O)NR-$, $-S$ -succinimido, amino $(-NR-)$, carboxylic ester $(-C(O)O-)$, sulfonamide $(-S(O)_2-NR-$, carbamate $(-O-C(O)-NR-)$, carbonate $(-O-C(O)-O-)$, sulfone $(-S(O)_2-)$, ether $(-O-)$, oxime $(-CR=N-O)$, hydrazone $(-CR=N-NR-)$, urea $(-NR-C(O)-NR-)$, thiourea $(-NR-C(S)-NR-)$, carbohydrate, glyceryl, phosphate $(-O-P(O)(OR)O-)$, phosphonate $(-P(O)(OR)O-)$, saturated and nonsaturated (hetero)cyclic compounds, in which R is H or a linear, branched or cyclical alkyl groups which may contain further functional groups or hetero atoms.
22. The composition of any one of claims 17 to 21, wherein the first branching functional groups Bfg are selected from amino $(-NRH)$, carboxylic acid $(-C(O)OH)$ and derivatives, sulfonic acid $(-S(O)_2-OH)$ and derivatives, carbonate $(-O-C(O)-O-)$ and

derivatives, hydroxyl (-OH), aldehyde (-CHO), ketone (-CRO), hydrazine (H₂N-NR-), isocyanate (-NCO), isothiocyanate (-NCS), phosphoric acid (-O-P(O)(OR)(OH) and derivatives, phosphonic acid (-P(O)(OR)OH) and derivatives, haloacetyl, alkyl halides, maleimide, acryloyl, arylating agents like aryl fluorides, hydroxylamine, disulfides like pyridyl disulfide, vinyl sulfone, vinyl ketone, diazoalkanes, diazoacetyl compounds, epoxide, oxirane, aziridine, in which R is H or a linear, branched or cyclical alkyl group which may contain further functional or hetero atoms or aryl groups.

23. The composition of any one of the above claims, wherein the cleavable linker L can be cleaved by TCEP, TFA, DTT, or buffer.
24. The composition of any one of the above claims, wherein the cleavable linker L further contains linker functional groups adapted to react between the cleavable linker L and the biologically active moiety by the formation of a chemical bond.
25. The composition of claim 24, wherein the linker functional groups are selected from the groups consisting of amino (-NRH), carboxylic acid (-C(O)OH) and derivatives, sulfonic acid (-S(O)₂-OH) and derivatives, carbonate(-O-C(O)-O) and derivatives, hydroxyl (-OH), aldehyde (-CHO), ketone (-CRO), isocyanate (-NCO), isothiocyanate (-NCS), haloacetyl, alkyl halides, maleimide, acryloyl, arylating agents, aryl fluorides, disulfides, pyridyl disulfide, vinyl sulfone, vinyl ketone, diazoalkanes, diazoacetyl compounds, epoxide, oxirane, aziridine, in which R is H or a linear, branched or cyclical alkyl group which may contain further functional groups or hetero atoms or aryl groups.
26. The composition of any one of the above claims, wherein the cleavable linker L is a traceless prodrug linker and contains a hydrolysable ester bond which can be hydrolysed and a carbamate.
27. The composition of claim 26, wherein the hydrolysable ester bond is a phenol ester.

28. The composition of any one of claims 18 to 27, wherein the composition includes a second branching unit B' with
- a second branching centre Bc'
 - at least two second branching functional groups Bfg' wherein at least one of the at least two molecular chains is connected between one of the at least two first branching functional groups Bfg and one of the at least two second branching functional groups Bfg'.
29. The composition of claim 27 further including a second cleavable linker L' comprising at least one second functional group Lfg' which is connectable with the biologically active moiety.
30. A method for selectively delivering a biologically active moiety to a target, which method comprises
- providing the composition according to any of claims 1 to 29;
 - bringing the composition into contact with a liquid containing the target.
31. A drug containing the composition of any one of claims 1 to 29.